Bachelor of Science in Smart & Sustainable Cities

Course Descriptions

SSC 200 Visual Communication for Urban Planners (0-6-3)

Graphic communication skills for urban planners; Techniques and applications of computer aided design in context of urban planning; Seek, produce, manage, exchange graphical information in design process; Introduction to Creative Suite applications for graphic communication and map making.
Prerequisite: None

SSC 201 Introduction to Smart & Sustainable Cities (3-0-3)

Planning, definition of smart and sustainable cities; principles of sustainable urban planning and design and the processes that develop and shape smart and sustainable cities; economic, social and environmental challenges facing urban areas; role of innovations in information communication technology (ICTs) in shaping the future of cities; sustainability assessment tools and their roles in forming smart, healthy, resilient, and inclusive cities and quality of life.
Prerequisite: None

SSC 202 Sustainable Urbanization (3-0-3)

The concept and process of urbanization; theories and approaches of urban sustainable development; the concept and measurements of sustainable urbanization and development in cities; urban sustainability initiatives in the context of urban economies, land-use practices, urban nature and ethical perspectives; programs and policies designed to enhance sustainable urban development.
Prerequisite: None

SSC 203 Humanizing the Smart City (3-0-3)

Interactions of "cyber-physical-human systems"; framework for capturing interactions and dynamics in human-machine system; demonstration of its applications in user case studies; smart cities initiatives and quality of life, examples of technology-oriented initiatives and social innovation strategies focusing on human-centered approaches and concepts dealing with social exclusion and inequalities in smart cities, including international case studies.
Prerequisite: *None*

SSC 211 Land Use & Environment (3-0-3)

Smart and sustainable land use. Infrastructure systems and municipal and regional models. Land use and sustainability paradigms relationship. Effects of urbanization on climate change and the environment. Exploration of relevant city policies and action plans such as alternative options for sustainable and renewable energy production, resilient water systems, green buildings, energy efficient transport and sustainable infrastructure.
Prerequisite: *None*

SSC 212 Urban Information Systems (2-2-3)

Principles of Urban Information Systems (UIS) and Geographic Information Systems (GIS). GIS and UIS Applications. Attribute and Spatial Data Structures, Map Projections, Spatial Analysis and Cartographic Production. Location Based Services and Internet GIS. Remote Sensing, and Global Positioning System

(GPS). GIS Planning and Implementation. Case studies of GIS adoption and application in Saudi Arabia and abroad.
Prerequisite: None

SSC 304 City Design I: Spatial Analysis (1-4-3)

A hands-on introduction to the principles of spatial analysis as they relate to city design. Using spatial data to understand the spatial patterns of cities, and how to use this information to inform their design decisions. The nature of spatial data. Spatial analysis techniques. The use of spatial data in city design.
Prerequisite: SSC 200

SSC 305 City Design II: Urban Form and Formation (1-4-3)

A hands-on exploration of the principles of urban form and formation, with an emphasis on the role of urban planning in shaping cities. The history of urban form. The different types of urban forms. The factors that influence urban form. The planning tools for shaping urban form.
Prerequisite: SSC 304

SSC 313 Urban System Modeling and Simulation (2-2-3)
Various models and simulation tools to study and solve urban problems. Models and simulations to study various aspects of urban land use, public facility siting, population analysis, resource allocation in congested urban settings, and transportation networks. The use of applied techniques in urban analysis. Vital urban survey tools and techniques of collecting primary data, as well as collecting and processing and analyzing secondary data.
Prerequisite: None

SSC314 Urban Indicators Assessment (3-0-3)

Smart urban development indicators analysis. The use of empirical evidence findings and conversion into informatics to improve decision making in planning and management of urban services. Applications through Urban Observatories and other urban services delivery and development agencies. Examples include, the collection, analysis and presentation of the SDG 17 based indicators at the local, regional, and national level compared with the international levels. Linkage with Regional plans assessment and the national vision. The basics of statistical analysis and statistical techniques. Application of different quantitative methods in city planning.
Prerequisite: None

SSC 321 Circular Economy (3-0-3)

Fundamentals of circular economy and the characteristics of a circular business model. Theoretical and empirical studies of the economic effects of urban environmental policies. Issues of costs and benefits of alternative sustainability policies to deal with air pollution, water quality, solid waste, and other climate change impacts. Economic valuation of the environment externality and circular urban development economy.
Prerequisite: None

SSC 331 Sustainable Infrastructure Systems (3-0-3)

Fundamentals of sustainable urban infrastructure systems. Aspects related to urban infrastructure development, urban energy, urban transportation, urban water, and urban social infrastructure. Concepts and approaches towards sustainable urban infrastructure development. Emphasis on

operations of technical urban infrastructure and insights relevant for policy and planning.
Prerequisite: None

SSC 399 Summer Training (0-0-1)

A continuous period of 8 weeks of one semester working in the industry to gain exposure and appreciation of the Smart City Planning profession. On-the-job training can be acquired in one or more of the areas related to Smart City Planning. The student is required to write a detailed report about his practical work experience. The report should emphasize duties assigned and completed by the student and gained skill and abilities.
Prerequisite: ENGL 214, Junior standing

SSC 406 City Design III: Digital Urban Twin (1-4-3)
A hands-on exploration of the use of digital urban twins in city design. 3D city models, real-time traffic simulations, and energy use models. Improved decision-making, increased collaboration, and enhanced visualization. Data collection, data quality, and technical expertise.
Prerequisite: SSC 305

SSC 407 Senior Design Project (0-6-3)

A capstone course integrating various components of the curriculum in a comprehensive original project. The project is an approved topic in the field of planning for smart and sustainable cities carried out based on the advice and supervision of the instructor to demonstrate the student knowledge and skills acquired during his four years of studies.
Prerequisite: SSC 406

SSC 422 Management of Smart Cities & Governance (3-0-3)

Smart city management and governance for urban and infrastructure development. Urban development and infrastructure management, accessibility, and usability in smart cities. ICT applications for the transformation of cities to smart cities. Citizens participation and representation in smart cities. Effective smart city governance processes and tools. Legal frameworks, negotiation, and managerial and administrative processes.
Prerequisite: None

SSC 425 City Resilience & Climate Change (3-0-3)

Basics of climate change problem and cities, the impact of climate change on the urban, natural, and built environment. Principles and concept of resiliency including social-ecological resilience to disasters. Mitigation and adaptation of climate change-related issues such as Greenhouse Gas (GHG) in urban areas, heat, and air pollution. Relevant tools, city policies, and action plans for mitigation and adaptation. Insight into the role of green and sustainable infrastructure in adapting cities for climate change.
Prerequisite: None

SSC 433 Smart Mobility (3-0-3)

Fundamentals of various mobility and transportation trends of smart mobility. Aspects and concepts related to smart and seamless mobility and transportation. The essentials of transport infrastructure and intramodality. Overview of smart mobility as an element in promoting sustainable urban transportation development and the role of stakeholders managing transportation needs. Insight to

smart mobility and services such as mobility as a service (MaaS) and different case studies. *Prerequisite: CE 341*

SSC 434 Digital Transformation of Cities (3-0-3)

History, terms, theories and methods of investigating the effects of digitization on society and cities. Technical design, usage patterns and the mutual influence of digitization, society and cities. International and local case studies of digital transformation of cities.
Prerequisite: None

SSC 481 Urban Ecology (3-0-3) *Elective*

Consequences of urbanization on ecological processes. The unique ecological features and impact due to population increase and expansions in built up areas. Nutrient cycling, urban greening, ecological landscaping, management of water features, flora and fauna, and planning techniques for sustainable ecosystems.
Prerequisite: None

SSC 491 Artificial Intelligence in Smart Cities (3-0-3) *Elective*

Artificial Intelligence (AI) in smart cities and urban mobility. AI as enabler smart urban solutions in efficient energy, water and waste management, reduced pollution, noise, and traffic congestions. IA digital transformation technological, social, and regulatory challenges for local authorities. Challenges in technology and data availability and reliability, lack of IA skills, and ethical IA use policy. *Prerequisite: None*

SSC 441 Plan Evaluation and Appraisal (3-0-3) *Elective*

Techniques and methods for assessment of different plans, programs, and public policies. Cost effectiveness, goal achievement, cost benefit, and cost revenue analysis. Pre and post implementation evaluation. Including development impact assessment methods; cost-benefit analysis, environmental impact assessment, and balance sheet.
Prerequisite: None

SSC 423 Urban Policy Development & Enactment (3-0-3) *Elective*

Design of the Urban service systems including plan for and design; development legislative mandates and regulations for designs operations; formal enactment facilitation. Analytic and interactional skills associated with the development and enactment of policies that give specification to Urban Planning and City service systems.
Prerequisite: None

SSC 419 Urban Code Development (3-0-3) *Elective*

Concept of the Urban Planning Code defining instances, documents, permits, and the methods of sanctions relating to town planning and construction. Urban planning documents at different level (the National Land Use Plan, Regional local Urban Planning Master Plan level) up to plans of development and subdivision impacting neighborhood and housing units' envelopes. Frontage, street elements, third place treatment, landscaped areas, etc. Land use, the code regulates the subdivision action at all levels including the right of first refusal, and its exercise and expropriation for public purposes.
Prerequisite: None

SSC 435 Sustainable Waste Recycling Systems (3-0-3) *Elective*

Concept of sustainable waste management. Approach to sustainable waste management focusing on the entire lifecycle of a product to reduce the negative environmental, social, and financial impacts of consumption. Sustainable waste management and circular economy; show cases of best practice from around the world.
Prerequisite: None

SSC 426 City Business Development (3-0-3) *Elective*

Fundamental business strategy (current developments, future opportunities) including strategies assisting city dealing with relevant trends and challenges. Concept of collective responsibility amongst businesses throughout the city; working with numerous public and private sector partners, creating and implementing an economically sustainable environment that stimulates a modern and growing economy, producing wealth for residents and businesses, strengthening existing and future industry clusters, diversifies the City economic base and increases the commercial revenue for the city. Introduction of best practices are of world class success stories.
Prerequisite: None

SSC 471 Urban Livability (3-0-3) *Elective*

Concept, principles and theory, metrics, and rankings of urban livability. Parameters for well-being and the spatial and policy mechanisms for fostering urban livability in different public space and street design. Examples of local and international best practice livable cities.
Prerequisite: None

For more information about the program, please visit:

https://acd.kfupm.edu.sa/undergraduate-programs/bsc-in-smart-sustainable-cities

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